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| ITU logo | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2017-2020 | **TSAG-TD606** |
| **TSAG** |
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| **Question(s):** | N/A | Geneva, 23-27 September 2019 |
| **TD** |
| **Source:** | Rapporteur, TSAG RG-StdsStrat |
| **Title:** | Update of the list of hot topics |
| **Purpose:** | Information, Discussion |
| **Contact:** | Didier BerthoumieuxRapporteur TSAG RG-StdsStrat | Tel: +33 6 08 56 51 10E-mail: didier.berthoumieux@nokia.com |

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| **Keywords:** | Standardization strategy; Hot topics; Status; CTO; |
| **Abstract:** | This TD provides an update of the list of Hot topics from LS16, collecting all inputs received by the RG-StdsStrat group. |

**Action**: TSAG RG-StdsStrat invited to review this update.

TSAG thanks the study groups for their responses to the liaison on hot topics. The Rapporteur Group on “Standardization Strategy” has analysed these responses as well as input from the recent CTO Advisory meetings and produced an updated hot topic list. The attached table includes a consolidated list of hot topics as well as information on the study groups involved in each of these topics.

Liaison replies to the original LS16 have been received from ITU-T SGs. As of September 18th, 2019, the following SGs have provided their responses to the liaison statement:

* + SG2[TD515], SG3[TD537], SG5[TD561], SG9[TD563], SG12[TD542], SG13[TD529], SG15[TD571], SG16[TD524], SG17[TD596], SG20[TD533].
	+ SG3, SG5, SG9 and SG15 answered with no change proposal to LS16 list.

Several answers proposed changes. The proposals which have not been included in the updated table are highlighted in bold underlined characters:

* SG2 has proposed the following additions:
	+ In hot topic n°9 “Accessibility”: Specification of an international numbering resource services for persons with disabilities (ITU-T E.disab, [SG2-C140](https://www.itu.int/md/T17-SG02-C-0140/en)).
	+ In hot topic n° 10 “Security”: work item on spoofing ( [SG2-TD 665](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0665/en)).
	+ In hot topic n°1 “OTT services”: work item on E.164 Numbers as identification for OTT ([SG2-TD 683-R2](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0683/en) and [SG2-TD 687-R2](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0687)).
	+ In hot topic n°12 “Intelligent network management”: work item on requirements for cloud and SDN-based network synergy management (ITU-T M.rcsnsm, [SG2-TD-673-R1](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0673))..
* SG12 proposal, which **is not included** in the updated table in annex 1:
* There are certainly many NFV activities, which go beyond the scope of 5G/IMT-2020. NFV is used in the core network, in data centers, and in offering the so-called “cloud-computing” services.
* The development of new Recommendation ITU-T Y.1550, “Considerations for Realizing Virtual Measurement Systems”, in Question 8/12 on Virtualized deployment of recommended methods for network performance, quality of service (QoS) and quality of experience (QoE) assessment. Additional work on this topic is identified in Appendix I/Y.1550.
* SG17 has two Recommendations in-progress related to the Security aspects of NFV.
* There are SG13 Recommendations in-progress on “Softwarization” of the network, which is simply a surrogate for NFV.
* SG11 has new work proposals in this area, appearing in the last year.

Proposal from SG12:

Remove NFV from the 5G/IMT-2020 item, and create an independent Hot Topic on NFV, citing the references above and listing the Study Groups with active work on this Hot Topic.

It may be appropriate to ask if SG13 are willing to be the main point of contact for this new topic. SG12 and others would of course be listed as cooperating study groups.

* SG 13 has proposed the following changes:
	+ In hot topic n°3 “Intelligence for network automation”, add: Y.qos-ml-arc: Architecture of machine learning based QoS assurance for IMT-2020 network, and Y.IMT2020-ML-arc: Architectural framework for machine learning in future networks including IMT-2020, and delete Y.qos-ml text.
	+ In hot topic n°4 “Open APIs”: delete Y.disfs and Y.SupbDDN-usecase
	+ In hot topic n°5 “5G/IMT2020 vision”: Delete Y.NGNe0-reqts, Y-IMT2020-arch, Y-IMT2020-CE-req, Y.amc, Y-SuppICN-PoC-DS.

Add Y.IMT2020-qos-fa: QoS functional architecture for IMT-2020 networks replacing Y.IMT2020-qos-fr. Add [Y.IMT2020-qos-req](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14740): QoS requirements for IMT-2020 network and Y.qos-ml-arc: Architecture of machine learning based QoS assurance for IMT-2020 network

Add Y.FMC-EC: Unified edge computing for supporting fixed mobile convergence in IMT-2020 networks, and Add Y.FMC-SM: Session management for fixed mobile convergence in IMT-2020 networks

* SG 16 proposals:
	+ In hot topic n°14 “Digital health”: add Q28/16 and FG AI4H with AI with its applications in certain medical and health domains.
	+ 3 other proposals **have not been included** in the updated table in annex 1:
		- Q5/16: Artificial intelligence-enabled multimedia applications
		- Q22/16: Distributed ledger technologies and e-services
		- proposed new Question 12/16 on visual surveillance systems and services that has submitted for TSAG review (see SG16-LS122).
* SG17 proposals:
	+ In hot topic n°1 “OTT services”, add : SG17 Correspondence Group on transformation of security studies identified the OTTs as part of the Digital Service Providers (DSPs) ecosystem
	+ In hot topic n°5 “5G/IMT2020 vision”: Replace current SG17 text by :

-SG17 support to this Hot Topic and the update covering the last two SG17 meetings to date consists of

-Q2 and 6/17 have supporting mandates with substantial work programs especially on SDN/NFV and 5G and Q8/17 dealing with Cloud Computing has connected work under development

- Approved new draft Recommendations: X.1042 (X.sdnsec-1) and X.1043 (X.sdnsec-3)

- New Work Items established: X.5Gsec-guide, X.sr\_cphr, X.nsom-sec, X.5Gsec-netec

- There are currently a growing number of 9 work items in the work programs of SG17.

* In hot topic n°10 “Security, privacy, trust”: Replace the current text by :

SG17 support to this Hot Topic covering the two last SG17 meetings consist of

1. For what concerns the list of sub Hot Topics:
* Workshops: Workshop on AI/ML and Security
* AI/ML is now part of question text of Q2, 4, 5 and 6/17
* New Work Items: TR.cs-ml on AI/ML
1. For what concerns more generally this Hot Topics
* Workshops: ITU Workshop on Fintech Security, Mini-workshop on Cybersecurity Challenges in Automated Driving
* Emerging new topics are establishing and develop and through the incubation mechanism pilot in particular about Quantum based security (see Hot Topic 15), but as well several new aspects of Security Architecture (Schemas for Integrated Cyber Defence, etc.)
* Through these observations, SG17 would like TSAG to consider potential changes on Hot Topic 10 sub items as Security Architecture topics emerged in Q2 and 4/17 (X.arch-design, TP.sec-arch, TP.ics-schemas, X.rf-csap, X.tf-mpc) but as well a significant development security for verticals with not only increase of activity for ITS with Q13/17 but the qualification of its usage by industry. As well finance work items in Q7/17 considerations of Question text changes and in relation to the Workshop listed above

We observe too a densification of work in the area of Managed Security Services and Cyber Defence Centres X.fram-cdc; DLT; Cloud Computing with the key containerisation X.sgcc and various deployment scenarios X.sgdc, etc.;

* In hot topic n°15 “Interoperable quantum safe comm./Quantum resistance”, replace the SG17 current text by:

SG17 update on this Hot Topics covering the two last SG17 meetings to date

Organized a Mini workshop on Secure Quantum Communications

Temporarily agrees to refer to this field as to “Quantum based security” subject to change in future meetings

Established the following new work items: X.sec\_QKDN-km, X.sec-QKDN-ov, X.sec-QKDN-tn

Experts participated in the ITU Workshop on Quantum in Shanghai

Experts contribute to SG13 work in Q16/13 and in particular to Y.3800

Agreed to collaborate with SG13 under the form of a collocated RGM meeting of Q4/17 and Q16/13.

* In addition, SG17 made the following 5 suggestions, **not included** in the updated table in Annex 1:

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| **#** | **Suggestion** |
| S1 | In SG17 the word Privacy is considered as very sensitive and SG17 tries to avoid as much as possible any definition or use of this word. Yet we observe that this is not the same views in other study group who do not seem to have any problem using this word.  |
| S2 | To place Cyber Insurance in Hot Topic 10Indeed, regarding Cyber Insurance, SG17 considers this is a valid topic for ITU as operators started to sell Cyber Insurance within their shops as it is a strong selling argument for their customers on the B2C side but it will be equally important if not more important for B2B and B2B2C when 5G verticalization is engaged. Furthermore, this is a critical area of development now with Cyber Threat Exchanges effectively in place for Insurance companies to apply actuarial science to assess risks. It is motivated by the fact that selling security products and services is hard. Interestingly selling cyber insurances is much easier and lucrative and at the end leads to selling the latter security products and services. Yet it is much easy to understand, deliver, manage, finance by all parties, insurances, customers, etc.In response to the market needs X.ciag: *Cyber insurance acquisition guideline for Information and Communication Technologies (ICT) services provider* was established as work item in SG17.We recognize too the existing partnership with ISO/IEC JTC1/SC27/WG1 on this topic with 27102 “Guidelines for Cyber Insurance” which was published in 2019. |
| S3 | Add Edge Cloud Security as part of Hot Topic 10 |
| S4  | The term Digital Humanities could now be replaced with the more widely adopted ‘Human Factor’ in cyber security context and could be defined as How to better include the Human Factor in the overall Cyber Security User Experience remembering that in 20 years the attacks went from very broad and narrowed to organizations, individuals and now are targeting more and more the brain. |
| S5 | Propose to review the title of Hot Topics 15 with the temporary consensus of SG17 as “Quantum based security” subject to change in future meetings |

* SG 20 has proposed the following changes
	+ In hot topic n°3 “Intelligence for network automation” : add SG20 participation with : Y.4116: “Requirements of transportation safety service including use cases and service scenarios”. Add: Y.IoT-AV-Reqts: “Requirements and capability framework of IoT infrastructure to support network-assisted autonomous vehicles”.
	+ In hot topic n°4”Open APIs”: add Y.IoT-NCM-reqts: Requirements and capabilities of network connectivity management in the Internet of things.
	+ In hot topic n°5 “5G/IMT2020 vision”: add draft new Recommendation ITU-T Y.UAV.arch “Functional architecture for unmanned aerial vehicles and unmanned aerial vehicle controllers using IMT-2020 networks”
	+ In hot topic n°8 “Augmented Reality”: add Y.IoT-AR: Framework for AR and VR based control in IoT: Q4/20, Y.Supp.42: Use cases of user-centric work space service: Q2/20, Y.UCS-Reqts: Requirements and capabilities of user-centric work space service: Q2/20
	+ In hot topic n°9 “Accessibility “: add Y.4204 “Accessibility requirements for the Internet of things applications and services”: Q2/20, and add Y.ACC-PTS “Accessibility requirements for smart public transportation services”: Q2/20.
	+ In hot topic n°10 “Security, privacy and trust”: SG20 is associated.
	+ In hot topic n°11 “Analytics”: add SG20 and FG DPM as associates, with following work items for SG20:

Y.SC-OpenData (Framework of Open Data in Smart Cities): Q1/20

[Y.IoT-BPM-reqts-caps](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14497) (Specific Requirements and Capabilities of the Internet of Things for business process management): Q2/20

[Y.4203](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=13687)  (Requirements of things description in the Internet of Things): Q2/20

Y.IoT-EC-reqts (IoT requirements for edge computing): Q2/20

Y.4116 (Requirements of transportation safety service including use cases and service scenarios): Q2/20

Y.4555 (Service functionalities of self-quantification over Internet of things): Q4/20

Y.4457 (Architectural framework for transportation safety services): Q4/20

Y.smart-evacuation (Framework of Smart Evacuation during emergencies in Smart Cities and Communities): Q4/20

Y.disaster-notification (Framework of the disaster notification of the population in Smart Cities and Communities): Q4/20

Y.dev-IoT-arch (Architectural reference models of devices for IoT applications): Q3/20

Y.SCCE-arch (Reference architecture of spare computational capability exposure of IoT devices for smart home): Q3/20

Y.cnce-IoT-arch (Functional architecture of cellular-radio network capability exposure for smart hospital based on Internet of things):Q3/20

Y.dec-IoT-arch (Decentralized IoT communication architecture based on information centric networking and blockchain): Q3/20

Y.AERS-msd (Minimum set of data structure for automotive emergency response system): Q3/20

Y.AERS-mtp (Minimum set of data structure for automotive emergency response system): Q3/20

Y.IoT-rf-dlt (OID-based Resolution framework for transaction of distributed ledger assigned to IoT resources): Q3/20

Y.IoT-ics (Requirements and functional architecture of open IoT identity correlation service): Q3/20

Y.UIIS (Unified identity/identifier/locator split (UIIS) services and architecture in IoT environment): Q3/20

Y.NDA-arch (Functional architecture of network-based driving assistance for autonomous vehicles): Q3/20

Y.SSC-AISE-arc (Reference architecture of artificial intelligence service exposure for smart sustainable cities): Q3/20

Y.smoke-detection (Requirements and Functional Architecture of Smart Fire Smoke Detection Service): Q4/20

Y.STD (Functional Architecture for Management to Smart Tourist Destinations): Q4/20

Y.STIS-fm (Function and metadata of Spatiotemporal Information Service for SSC): Q4/20

* And the following work items for FG DPM:

Technical Specification D3.2: SensorThings API – Sensing;

Technical Specification D3.3: Framework to support data interoperability in IoT environments;

Technical Report D3.5: Overview of blockchain for supporting IoT and SC&C in DPM aspects;

Technical Specification D3.7: Blockchain-based data management for supporting IoT and SC&C.

* + In hot topic n°14 “Digital health” : add SG20 associated and add Y.IoT-EH-PFE (Performance evaluation frameworks of e-health systems in the IoT): Q7/20

SG20 proposes also 3 new hot topics:

* + Assessment and evaluation of smart city and IoT verticals (e.g. detailed mobility, detailed energy management, detailed water management, etc.)
	+ Solutions in smart sustainable cities using emerging technologies (e.g. IoT, AI, etc).
	+ Smart villages and rural areas
* The TSAG RG-StdsStrat e-meeting report TD489att4-D034 has identified some proposals of additional hot topics:
	+ From the CJK CTO meeting report, the following topics were proposed
		1. Open-source movement and network ‘softwarization’,
		2. the value of Artificial Intelligence (AI) to the automation of network operation and maintenance, the importance of preparations for the arrival of quantum information technologies,
		3. the necessity of investment in all-fibre networks,
		4. and the increasing relevance of innovation in support of datacentre interconnection

The update of the hot topic table **does not include** those new proposals.

* From the contribution TSAG RG-StdsStrat C0012 from MIIT (China), proposal to add hot topics on Quantum Technologies. The hot topic n°15 includes already this domain, **no new QIT hot topics has been included** yet.

**Updated Table 1 – List of topics (As of 22 September 2019) (to be updated)**

| **Topic [References]** | **ITU-T Topic Point of Contacts**  | **Work items, (planned) activities (WS, FG, etc., comments** |
| --- | --- | --- |
| 1. **OTT services and the economic impacts, Cross-industry collaboration [**[**TSAG TD101**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-170501-TD-GEN-0101)**]**
* The interplay of OTT service providers and operators, particularly in developing countries
* The economic impact of OTT services and operators
* International standards, frameworks, best practices and guidelines on OTT services.
 | **SG3****SG2****SG9****SG16****SG17** | **[SG3: TD330]**1. [D7\_R\_OTTBypass](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14531) (Regional Recommendation on OTT bypass including national and regional collaboration between Member States and operators to deal with the OTT bypass issue)
2. [D.50Supp\_OTT](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13500) (OTTs in the context of IIC);
3. [D.ConsumerOTT](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14123) (Customer redress mechanism and consumer protection);
4. [D.262 (ex D.OTT)](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13503) (Collaborative Framework for OTTs);
5. [D.OTTBypass](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13522) (OTT Bypass);
6. [D.OTTMNO](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13521) (Guidelines on OTT-MNO Partnerships).

**[SG2: TD344, TD515]**New work items on OTT are under development in SG2New work item in regards to the use of E.164 Numbers as identification for OTT. SG2 will be working on a technical report to study the current use of telephone numbers, as well as a supplement to provide guidance ([SG2-TD 683-R2](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0683/en) and [SG2-TD 687-R2](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0687)).**[SG9: TD404]**Regarding OTT services, SG9 has started a new work item on draft Recommendation J.cable-ott “System architecture and interfaces between a cable television operator and an OTT service provider”.**[SG16: TD347]**SG16 is working on technical aspects of provisioning of OTT service over IPTV**[SG17: TD362, TD596]**SG17 Correspondence Group on transformation of security studies identified the OTTs as part of the Digital Service Providers (DSPs) ecosystem.The recognition of OTT services doesn’t just impact economical aspects. SG17 identified OTTs as one of the new actors in the ecosystem that impacts Security as part of its transformation of security studies. Several recommendations and current work items had and are already taking into account the changes and SG17 has listed Cloud (covering OTTs) as a new potential Question in its long term prototypes. Today this concerns Q7/17 and Q8/17a) SG17b) - work items, e.g. X,1147 (X.srfb), X.1450 (X.hakm), X.sfop - workshops: none- Focus Groups: unknown- outside of ITU: tmforum about the Digital Service Provider (DSP) ecosystem- cooperation mechanism: unknown c) OTTs are part of the overall DSP ecosystem which is a more powerful paradigm to describe the nature of the ecosystem transformationd) Today the contributors and editors are the first one facing the difficult problem to develop text with no framework and definitions. So there is an interest but the framework that would allow interest doesn’t exist. |
| 1. **VoLTE/ViLTE interconnection and adoption of ENUM for IMS interconnection [**[**TSAG TD160**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**]**
 | **SG11** in cooperation with SG2 | **[SG11: TD349]**1. Related achievements of ITU-T SG11 include:* [Q.3640](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13482): Framework of interconnection of VoLTE/ViLTE-based networks
* [Q.3953](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13490): VoLTE/ViLTE interconnection testing for interworking and roaming scenarios
* Q.Suppl69: Framework for interconnection between VoLTE-based network and other networks supporting emergency telecommunications service (ETS)
* [ITU Regional Forum](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180604/Pages/default.aspx) on “Internet of Things, Telecommunication Networks and Big Data as basic infrastructure for Digital Economy” (St. Petersburg, Russia, 4-6 June 2018)
* [ITU Regional Workshop](https://www.itu.int/en/ITU-D/Regional-Presence/CIS/Pages/EVENTS/2018/10_Samarkand/10_Samarkand.aspx) on deployment of VoLTE/ViLTE networks based on IMS. From standardization to implementation (Samarkand, Uzbekistan, 2-3 October 2018)

2. Related current work items of SG11 include:* Q.DEN\_IMS: Signalling architecture of distributed ENUM networking for IMS

**[SG17: TD362]**Q2/17 developed X.1041 (X.voltesec-1): Security Framework for voice-over-long-term-evolution (VoLTE) Network Operation. |
| 1. **Intelligence for network automation, augmentation and amplification [**[**TSAG TD160**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**]**
* Identify the standardization needs for intelligence in 5G systems and the telecommunications sector.
* Automatic detection and resolution of anomalies and other incidents of inefficiency, as well as predictive maintenance will reduce the operational expenditure of network operators and service providers
* Address the architecture, interfaces, functional entities, service scenarios and protocols required for intelligence retrieval and actuation, and the performance benchmarking and certification of AI techniques
* Usage of AI in security management solutions
 | **SG13****SG9****SG20** | **[SG9: TD404]**Regarding intelligence for network automation, augmentation and amplification, SG9 has started a new work item on draft Recommendation J.pcnp-fmw “Premium Cable network platform with embedded intelligent analyzer and controller for enabling advanced multimedia services”.**[SG13: TD356, TD529]**Y.sfes: Smart Farming Education Service based on u-learning environmentY.qos-ml-arc: Architecture of machine learning based QoS assurance for IMT-2020 networkY.MecTA-ML: Mechanism of traffic awareness for application-descriptor-agnostic traffic based on machine learningY.MLaaS-reqts: Cloud computing - Functional requirements for machine learning as a serviceY.IMT2020-ML-arc: Architectural framework for machine learning in future networks including IMT-2020**[SG17: TD362]**Network automation, augmentation and amplification with the promise of a “Zero Touch” will be an illusion if it doesn’t intimately include Security at its design level. How to distinguish a management of network anomaly from a security incident? SG17 identified this gap as well as others and is putting 5G Security at the core of its Q6/17 as lead question SG17 and SG13 should collaborate here.**[SG5: TD374]**ITU-T SG5 draft L.DCIM “Specifications for datacentre infrastructure management system based on big data and artificial intelligence technology”.**[SG20: TD533]**Y.4116: “Requirements of transportation safety service including use cases and service scenarios”.Y.IoT-AV-Reqts: “Requirements and capability framework of IoT infrastructure to support network-assisted autonomous vehicles”. |
| 1. **Open APIs, enabling third parties to access and build on network capabilities to develop innovative, reusable services [**[**TSAG TD160**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**]**
 | **SG13****SG11** (Cooperating SG)SG20 | **[SG13: TD356, TD529]**Y.PTDN-T-interface: T interface in Public packet Telecommunication Data Network (PTDN)**[SG11: TD349]**Work item in Q6/11Q.CE-APIMP: Protocol for managing capability exposure APIs in IMT-2020 network**[SG17: TD362]**Open APIs cannot be delivered without Security (by design) which is what Q7/17 covers. SG17 and SG13 should collaborate here.**[SG20: TD533]**Y.IoT-NCM-reqts: Requirements and capabilities of network connectivity management in the Internet of things. |
| 1. **Realizing 5G/ IMT-2020 vision [**[**TSAG TD101**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-170501-TD-GEN-0101)**,** [**TSAG TD160**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**,** [**TSAG C27-R2**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-C-0027)**,** [**TSAG C29**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-C-0029)**]**
* Unified access-independent network management
* Standardization roadmap on IMT-2020
* ICN (Information Centric Networks) with scalability, mobility and security
* Open-source software and standards for 5G
* Software-based networking functions to optimize a per-session based performance
* Emerging fronthaul and midhaul technologies to support the 5G deployment
* Large-bandwidth backhaul and fronthaul solutions
* Concrete strategies for the migration from 4G to 5G systems.
* End-to-end network orchestration, control and management
* Service-based network architecture
* Open service management APIs for the Internet of Things
* Electromagnetic field (EMF) studies around 5G beam-forming capabilities
* Interoperability of services supporting public safety.
* Control and management protocols for IMT-2020
* Virtualized deployment of recommended methods for network performance, quality of service (QoS) and quality of experience (QoE) assessment.
 | **SG13** in cooperation with SGs 2, 5, 11, 12, **15,** 16, 17 and 20 | **[SG5: TD374]**ITU-T SG5 has established the vision on “Setting the Environmental Requirements for 5G”. During its September 2018 meeting, ITU-T SG5 has agreed on the Supplement K.Suppl.16 (ex. K.Supp-5G\_EMF\_Compliance) on Electromagnetic field (EMF) compliance assessments for 5G wireless networks.Additionally, SG5 is working on the following work items:* ITU-T L.5g\_powering on “Sustainable power feeding solutions for 5G network”
* ITU-T L.EE\_5G on “Energy efficiency Metrics and measurement methodology for 5G solutions”
* ITU-T L.ENV-KPI-5G-ARCH on “Environmental KPIs/metrics for 5G architectures”

**[SG13: TD356, TD520]**Y.NGNe-O-arch: Functional architecture of orchestration in NGNeY.IMT2020-qos-fa: QoS functional architecture for IMT-2020 networks[Y.IMT2020-qos-req](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14740" \o "See more details); QoS requirements for IMT-2020 networkY.qos-ml-arc: Architecture of machine learning based QoS assurance for IMT-2020 networkY.IMT-2020.qos-mon: IMT-2020 network QoS monitoring architectural frameworkY.IMT2020-CEF: Network capability exposure function in IMT-2020 networksY.3MO: Requirements and Architectural Framework of Multi-layer, Multi-Domain, Multi-Technology OrchestrationY.IMT2020-ADPP: Advanced Data Plane Programmability for IMT-2020Y.NetSoft-SSSDN: High level architectural model of network slice support for IMT-2020 - Part: SDNY.NSOM: Network slicing orchestration and managementY.FMC-ARCH: Functional architecture for supporting fixed mobile convergence in IMT-2020 networksY.FMC-CE: Capability exposure enhancement for supporting FMC in IMT-2020 networkY.FMC-EC: Unified edge computing for supporting fixed mobile convergence in IMT-2020 networksY.FMC-MM: Mobility management for fixed mobile convergence in IMT-2020 networksY.FMC-ReqMO: IMT-2020 FMC functional requirements for management and orchestrationY.FMC-SM: Session management for fixed mobile convergence in IMT-2020 networksY.FMC-SS: Service scheduling for supporting FMC in IMT-2020 network**[SG11: TD349]**1. Related achievement of SG11:* Q.5001: Signalling requirements and architecture of intelligent edge computing

2.Related current work items of Q6/11:* Q.NS-LCMP: Protocol for network slice lifecycle management
* Q.CE-APIMP, Protocol for managing capability exposure APIs in IMT-2020 network
* Q.D2D-EECP: Energy efficient D2D communication protocol for IMT 2020 network
* Q.IMT2020-PFW: Protocol Framework for IMT-2020

3. Related current work items of Q7/11:Q.QMP-TCA QoS management protocol for time constraint applications over SDN**[SG12: TD337]**Draft new Recommendation Y.cvms, “Considerations for Realizing Virtual Measurement Systems”, in Question 8/12**[SG17: TD362, TD596]**SG17 support to this Hot Topic and the update covering the last two SG17 meetings to date consists of- Q2 and 6/17 have supporting mandates with substantial work programs especially on SDN/NFV and 5G and Q8/17 dealing with Cloud Computing has connected work under developmentSince last TSAG meeting SG17 can update this Hot Topic with:- Approved new draft Recommendations: X.1042 (X.sdnsec-1) and X.1043 (X.sdnsec-3)- New Work Items established: X.5Gsec-guide, X.sr\_cphr, X.nsom-sec, X.5Gsec-netec- There are currently a growing number of 9 work items in the work programs of SG17.**[SG15: TD385]**Work items of ITU-T SG15 in cooperation with SG13* Transport network to support IMT-2020/5G,
* Optical access transport systems to serve the 5G fronthaul application,
* incl. Fronthaul, midhaul and backhaul network considerations for IMT-2020/5G.

**[SG20: TD533]**Draft new Recommendation ITU-T Y.UAV.arch “Functional architecture for unmanned aerial vehicles and unmanned aerial vehicle controllers using IMT-2020 networks” |
| 1. **Gigabit-speed broadband access services and networks [**[**TSAG TD101**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-170501-TD-GEN-0101)**]**
* Support the delivery of high-definition video services
* Broadband access networks; G.fast, G.hn, VDSL2, NG-PON2
* True fixed-mobile convergence, hybrid fixed wireless.
 | **SG15**SG9 | **[SG17: TD362]**In the same line as for 1) OTTs and vertical industries are actually part of a new ecosystem called the Digital Service Providers. One of the presentation at the ITU-CTO meeting of May, showed some of the implications from a security point of view regarding the topic and is at the heart of the transformation of security studies by SG17. SG17 will support the new FG-NET2030 which relates to this point for one part. This is certainly a Q2/17, Q6/17, Q8/17 topic today.**[SG15: TD385]**Work items of ITU-T SG15 WP1* Optical systems for fibre access networks: XG(S)-PON, NG-PON2, Higher-Speed PON and MW-PON (Multi-wavelength PON),
* Broadband access over metallic conductors: VDSL2, G.fast and G.mgfast (Multi-Gigabit fast),
* Broadband in-premises networking: G.hn and G.hn2 (unified high-speed wire-line based home networking transceivers), indoor optical camera communication transceivers (G.occ), and high speed indoor visible light communication transceiver (G.vlc).

**[SG9: TD404**SG9 started two new work items to standardize the 5th Generation DOCSIS which is capable of gigabit broadband access over cable networks (DOCSIS 3.1 full duplex |
| 1. **Data Center Interconnection for OTT and vertical industries [**[**TSAG C37**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-C-0037)**]**
* OTT’s business and services models in relation to telecom services
* Requirements from OTT for DCI/metro network technologies (such as short distance, large bandwidth, low-cost optical (WDM) technology, fixed network), and standards.
 | **SG15****SG11** (Cooperating SG)SG9 | **[SG11: TD349]**Work item in Q4/11Q.SD-DCI: Signalling requirements and information model of SD-DCI service**[SG17: TD362]**There are a number of inherent underlying assumptions of minimum security requirements behind this point. As most of it will be AI powered, if the AI is attacked from a security stand point it can lead to significant risks and damages. Mostly Q6/17 with Q7/17 are involved herea) SG17b)- work items: Q6/17 and Q7/17- workshops: 5G Securityc) The underlying AI/ML topic necessary here is not listed.**[SG15: TD385]**Work items of ITU-T SG15* ITU-T SG15 provides the network infrastructure for DCI and does not consider the applications using the infrastructure.

**[SG9: TD404]**Regarding OTT services, SG9 has started a new work item on draft Recommendation J.cable-ott “System architecture and interfaces between a cable television operator and an OTT service provider”. |
| 1. **Augmented reality & virtual reality, video services [**[**TSAG C6**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-C-0006)**,** [**TSAG TD101**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-170501-TD-GEN-0101)**]**
* Applications with high network requirements in throughput and latency
* A range of innovative technologies in transport, IP and access networking, media coding and cloud and edge computing.
* NG video codec standardization with emphasis on 5G and vertical industries
* Future Content Delivery Network (CDN) technologies and standards.
* Immersive live experience (ILE)
* Digital signage
 | **SG16****SG12 (**It is necessary to include SG12 as a cooperating study group for AR/VR and Video topic**SG11** (Cooperating SG)SG9SG20 | **[SG16: TD347]**1. New Recs. H.430-series on immersive live experience
2. Activities: Three Mini-workshops on ILE were held on Sep 2016 and Jan, Oct 2017.
3. Related SDOs: MPEG, DVB, EBU, 3GPP, VRIF
4. H.780 “Digital signage: Service requirements and IPTV-based architecture”
5. H.DS-FIS “Digital signage: Framework for interactive services”

**[SG11: TD349]**Work items in Q8/111. [X.609.3 (ex X.mp2p-mssr)](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13345) Managed P2P communications: Multimedia streaming signalling requirements
2. [X.609.4 (ex X.mp2p-mspp)](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13493) Managed P2P communications: Multimedia streaming peer protocol
3. [X.609.5 (ex X.mp2p-msomp)](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13494) Managed P2P communications: Multimedia streaming overlay management protocol
4. X.mp2p-cdsr: Managed P2P communications: Content distribution signalling requirements
5. X.mp2p-cdpp: Managed P2P communications: Content distribution peer protocol

**[SG9: TD404]**Regarding augmented reality & virtual reality, video services, SG9 consented J.302amd-1 “System specifications of augmented reality smart television service Amd #1”, and has started to develop a new technical paper TP.b-catv “Broadband CATV system using server-side reception and processing” for enabling advanced video services (e.g. 360 degree video) through existing broadband CATV system.**[SG20: TD533]**Y.IoT-AR: Framework for AR and VR based control in IoT: Q4/20Y.Supp.42: Use cases of user-centric work space service: Q2/20Y.UCS-Reqts: Requirements and capabilities of user-centric work space service: Q2/20 |
| 1. **Accessibility by design, mainstreaming the consideration of needs of persons with disabilities and other persons with specific needs to build inclusive ICT solutions [**[**TSAG TD160**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**]**
 | **SG16****SG2****SG20** | **[SG2: TD344]**a global resource for services to promote accessibility.New work item was created for a recommendation that specifies a country code that is available for use by entities who wish to offer international telecommunication services for persons with disabilities and persons with specific needs (ITU-T E.disab, [SG2-C140](https://www.itu.int/md/T17-SG02-C-0140/en)).**[SG16: TD 347]**H.702 "Accessibility profiles for IPTV systems"F.791 "Accessibility terms and definitions"F.921 "Audio-based indoor and outdoor network navigation system for persons with vision impairment"F.930 "Multimedia telecommunication relay services".**[SG20: TD533]**Y.4204 “Accessibility requirements for the Internet of things applications and services”: Q2/20Y.ACC-PTS “Accessibility requirements for smart public transportation services”: Q2/20 |
| 1. **Security, Privacy and Trust [**[**TSAG TD101**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-170501-TD-GEN-0101)**,** [**TSAG TD160**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**]**
* Principles of transparency and technological integrity
* Mitigation of the risks posed by IoT botnets
* Assessment of the impact of quantum computing
* Potential of blockchain and its implications for security
* Data-centric security
* Security and privacy by design, considering security and privacy from the outset of ICT services’ development through to the proactive monitoring and protection of live services
* Security, privacy, and trust in the presence of AI and ML
* Application security and quantum-safe cryptography through an “incubation” process
* Identity and authorization, providing for the reliable identification essential to secure, efficient service provision.
* Security and privacy of digital humanities (intersection of computer science and the humanities)
* Security of Robotics/IoT
* Cybersecurity Services
 | **SG2****SG17** | **[SG2: TD515]**New work item on "spoofing" in regards to E.156 and E.157. Unwanted calling appears to be on the rise around the world. The unwanted calls often use non-existent telephone numbers, or use a number that is not the number of the originator. This work will provide information on nuisance calling, spoofing, etc. and initiatives to address those concerns. ( [SG2-TD 665](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0665/en)).**[SG17: TD362, TD596]**SG17 support to this Hot Topic covering the two last SG17 meetings consist of1. For what concerns the list of sub Hot Topics:
* Workshops: Workshop on AI/ML and Security
* AI/ML is now part of question text of Q2, 4, 5 and 6/17
* New Work Items: TR.cs-ml on AI/ML
1. For what concerns more generally this Hot Topics
* Workshops: ITU Workshop on Fintech Security, Mini-workshop on Cybersecurity Challenges in Automated Driving
* Emerging new topics are establishing and develop and through the incubation mechanism pilot in particular about Quantum based security (see Hot Topic 15), but as well several new aspects of Security Architecture (Schemas for Integrated Cyber Defence, etc.)
* Through these observations, SG17 would like TSAG to consider potential changes on Hot Topic 10 sub items as Security Architecture topics emerged in Q2 and 4/17 (X.arch-design, TP.sec-arch, TP.ics-schemas, X.rf-csap, X.tf-mpc) but as well a significant development security for verticals with not only increase of activity for ITS with Q13/17 but the qualification of its usage by industry. As well finance work items in Q7/17 considerations of Question text changes and in relation to the Workshop listed above

We observe too a densification of work in the area of Managed Security Services and Cyber Defence Centres X.fram-cdc; DLT; Cloud Computing with the key containerisation X.sgcc and various deployment scenarios X.sgdc, etc.; |
| 1. **Analytics, supporting the development of evidence-based, data driven services [**[**TSAG TD160**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**]**
* Data processing and management for IoT and SC&C
* Common things description methodology
* Interoperability framework and functional architecture for IoT and SC&C
* Industry dependent data models and formats to support development of data driven IoT and SC&C services
* Features, requirements, framework and functional architecture of IoT device, gateway, platform, network
* Edge Computing to support evidence-based, data driven IoT and SC&C services
* Distributed ledger technologies for IoT and SC&C
* IoT identification to support evidence-based data driven IoT and SC&C services
* AI enabled IoT and SC&C
* Data driven IoT verticals
* Data Security
 | **SG20****SG17** | **[SG17: TD362]**Analytics is already covered in Q7/17 with recommendations in consent and in Q13/17 with several underlying aspects in Q8/17 and potentially othersa) Yes, SG17 is missingb) - work items: X.srfb, WTSA-16 Res.94, etc.**[SG20: TD339, TD533]**1. Y.SC-OpenData (Framework of Open Data in Smart Cities): Q1/20
2. [Y.IoT-BPM-reqts-caps](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14497) (Specific Requirements and Capabilities of the Internet of Things): Q2/20
3. [Y.4203](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=13687" \o "See more details)  (Requirements of things description in the Internet of Things): Q2/20
4. Y.IoT-EC-reqts (IoT requirements for edge computing): Q2/20
5. Y.4116 (Requirements of transportation safety service including use cases and service scenarios): Q2/20
6. Y.4555 (Service functionalities of self-quantification over Internet of things): Q4/20
7. Y.4457 (Architectural framework for transportation safety services): Q4/20
8. Y.smart-evacuation (Framework of Smart Evacuation during emergencies in Smart Cities and Communities): Q4/20
9. Y.disaster-notification (Framework of the disaster notification of the population in Smart Cities and Communities): Q4/20
10. Y.dev-IoT-arch (Architectural reference models of devices for IoT applications): Q3/20
11. Y.SCCE-arch (Reference architecture of spare computational capability exposure of IoT devices for smart home): Q3/20
12. Y.cnce-IoT-arch (Functional architecture of cellular-radio network capability exposure for smart hospital based on Internet of things):Q3/20
13. Y.dec-IoT-arch (Decentralized IoT communication architecture based on information centric networking and blockchain): Q3/20
14. Y.AERS-msd (Minimum set of data structure for automotive emergency response system): Q3/20
15. Y.AERS-mtp (Minimum set of data structure for automotive emergency response system): Q3/20
16. Y.IoT-rf-dlt (OID-based Resolution framework for transaction of distributed ledger assigned to IoT resources): Q3/20
17. Y.IoT-ics (Requirements and functional architecture of open IoT identity correlation service): Q3/20
18. Y.UIIS (Unified identity/identifier/locator split (UIIS) services and architecture in IoT environment): Q3/20
19. Y.NDA-arch (Functional architecture of network-based driving assistance for autonomous vehicles): Q3/20
20. Y.SSC-AISE-arc (Reference architecture of artificial intelligence service exposure for smart sustainable cities): Q3/20
21. Y.smoke-detection (Requirements and Functional Architecture of Smart Fire Smoke Detection Service): Q4/20
22. Y.STD (Functional Architecture for Management to Smart Tourist Destinations): Q4/20
23. Y.STIS-fm (Function and metadata of Spatiotemporal Information Service for SSC): Q4/20

**[FG-DPM]**1. Technical Specification D3.2: SensorThings API – Sensing;
2. Technical Specification D3.3: Framework to support data interoperability in IoT environments;
3. Technical Report D3.5: Overview of blockchain for supporting IoT and SC&C in DPM aspects;
4. Technical Specification D3.7: Blockchain-based data management for supporting IoT and SC&C.
 |
| 1. **Intelligent network management towards future networks** **[**[**TSAG TD**](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-180226-TD-GEN-0160)**344]**
* Smart operation, management and maintenance.
* Telecom anti-fraud management
* REST-based network management framework
 | **SG2** | **[SG2: TD344, TD515]**1. M.somm: Framework of smart operation, management and maintenance.
2. M.tsm: Principles for telecommunications smart maintenance.
3. M.rtsmf: Requirements for telecommunications smart maintenance management functions
4. M.tsm-gim: Generic information model for telecommunications smart maintenance
5. M.rdm: Requirements for Data Management in the TMN
6. M.rtafm: Requirements for Telecom anti-Fraud Management in the TMN.
7. X.rest : Guidelines for the definition of REST-based managed objects and management interface
8. Q.rest: REST-based management services
9. M.rcsnsm: A new work item was created for a Recommendation that specifies the requirements for cloud and SDN-based network synergy management ([SG2-TD-673-R1](https://www.itu.int/md/T17-SG02-190219-TD-GEN-0673)).
 |
| 1. **Environmental efficiency of emerging technologies**

Assessment of the environmental impacts of deploying and implementing AI, Blockchain, and other emerging technologies. | **SG5** | **[SG5: TD374]****A proposal for a new Focus Group on Environmental Efficiency for Artificial Intelligence and other emerging technologies** has been presented during the SG5 meeting that took place from 11-21 September 2018. The Final approval of this FG will be decided during the next SG5 meeting planned in May 2019. |
| 1. **Digital health**
 | **SG16****SG20** | **[SG16: TD347, TD524]**1. H.870 (ex F.SLD) on safe listening systems
2. H.810-series on personal connected health
3. H.860-series on multimedia brain information platform
* Q28/16 and FG AI4H with AI with its applications in certain medical and health domains.

**[SG20: TD533]*** 1. Y.IoT-EH-PFE (Performance evaluation frameworks of e-health systems in the IoT): Q7/20
 |
| 1. **Interoperable Quantum safe communications/Quantum Resistance [SG17: TD362]**

Quantum cryptography and key distributions are essential to the long term resistance of any digital life. It is a major problem to address within a 10 years horizon, yet facing challenges of the high incentives of the Quantum Computing ‘attack’ weaponry to succeed sooner.The impending arrival of quantum computing poses significant risks to security. Quantum-safe cryptography is essential to preparations for that arrival. Public key cryptography is a cornerstone of authentication over public networks. Quantum computing is quick to solve integer-factoring and discrete-logarithm problems, problems relied on by almost all public key cryptography. Recognizing the increasing importance of quantum-safe public key cryptography, SG17 identified the need for ITU standards to provide for interoperable quantum-safe communications, in particular the secure distribution of symmetric encryption keys. | **SG17****SG13** | **[SG17: TD596]** SG17 update on this Hot Topics covering the two last SG17 meetings to date* Organized a Mini workshop on Secure Quantum Communications
* Temporarily agrees to refer to this field as to “Quantum based security” subject to change in future meetings
* Established the following new work items: X.sec\_QKDN-km, X.sec-QKDN-ov, X.sec-QKDN-tn
* Experts participated in the ITU Workshop on Quantum in Shanghai
* Experts contribute to SG13 work in Q16/13 and in particular to Y.3800

Agreed to collaborate with SG13 under the form of a collocated RGM meeting of Q4/17 and Q16/13.**[SG13]**Y.QKDN\_FR Framework for Networks to supporting Quantum Key Distribution |
| 1. **Assessment and evaluation of smart city and IoT verticals (e.g. detailed mobility, detailed energy management, detailed water management, etc.)**
 | **SG20** | **[SG20: TD533]****Proposed new hot topic**  |
| 1. **Solutions in smart sustainable cities using emerging technologies (e.g. IoT, AI, etc).**
 | **SG20** | **[SG20: TD533]****Proposed new hot topic** |
| 1. **Smart villages and rural areas**
 | **SG20** | **[SG20: TD533]****Proposed new hot topic** |

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